

Amendments to the Claims:

1. (currently amended) A transition for transmitting a mm-wave signal from one plane to another, said transition comprising:

first and second transmission lines on parallel planes;

a waveguide third transmission line orthogonal to said first and second transmission lines, wherein either said first and second transmission lines are suitable for transmitting a TEM mode signal and said waveguide third transmission line is suitable for transmitting a waveguide mode signal, or said third transmission line is suitable for transmitting a TEM mode signal and said first and second transmission lines are suitable for transmitting a waveguide mode signal; and

a support plate between said first and second transmission lines, said support plate defining a borehole with conductive walls between said first and second transmission lines;

a metalized dielectric filler comprising at least one conductive layer and being disposed in said borehole such that said conductive layer and at least a portion of said conductive walls of said borehole form said waveguide, whereby said waveguide is smaller than said borehole.

~~first and second transducers, said first transducer coupled between said first and third transmission lines, said second transducer coupled between said second and third transmission lines, each of said transducers being suitable for converting a signal between TEM and waveguide.~~

2. (cancelled)

3. (currently amended) The transition of claim ~~2~~ 1, wherein said first or second transmission line is a microstrip.
4. (currently amended) The transition of claim ~~2~~ 34, wherein said first and second transmission lines and said first and second transducers are disposed on first and second mm-wave boards, respectively.
5. (original) The transition of claim 4, wherein said mm-wave boards are overlapping.
6. (original) The transition of claim 5, wherein said mm-wave boards are separated by a distance of at least 10% of an operating signal wavelength.
7. (original) The transition of claim 4, wherein at least one of said mm-wave boards comprises electrical circuitry.
8. (currently amended) The transition of claim ~~4~~ 34, wherein said first transducer converts a TEM mode signal ~~from a TEM mode~~ to a rectangular waveguide mode signal and said second transducer converts a rectangular waveguide mode ~~-signal~~ signal ~~from a waveguide mode~~ to a TEM mode signal.
9. (cancelled).
10. (currently amended) The transition of claim ~~9~~ 8, wherein said rectangular waveguide mode signal is a TE₁₀ mode signal.
11. (currently amended) The transition of claim ~~4~~ 34, wherein each transducer comprises:

a transmission portion connected to ~~its~~the respective transmission line of the transducer; and
said ~~a~~ waveguide portion being configured to facilitate the propagation of a waveguide mode signal therethrough in a plane orthogonal to the transmission portion; and
~~a conversion portion electrically connected between said transmission portion and said waveguide portion; said conversion portion being configured to convert a signal between a TEM mode and a horizontal rectangular waveguide mode.~~

12. (cancelled).
13. (original) The transition of claim 11, wherein said transmission portion, said waveguide portion, and said conversion portion share a common substrate.
14. (currently amended) The transition of claim 13, wherein said waveguide portion comprises a conductive barrier defined in said substrate.
15. (original) The transition of claim 14, wherein said conductive barrier is a metallic wall.
16. (original) The transition of claim 14, wherein said conductive barrier is a perforated metallic wall.
17. (original) The transition of claim 1, wherein said first and second transducers are identical.
18. (cancelled)

19. (original) The transition of claim 18, wherein said waveguide is a rectangular waveguide.

20. (currently amended) The transition of claim 2 1, wherein said waveguide has a length of at least 0.25 mm.

21. ~~(cancelled)~~ ~~The transition of claim 2 1, wherein said waveguide comprises a metalized dielectric filler.~~

22. (currently amended) The transition of claim 11, wherein said waveguide ~~comprises a metalized dielectric filler~~ having has an impedance which matches that of said waveguide portion.

23. (cancelled)

24. (currently amended) The transition of claim 23 1, wherein said support plate is rigid.

25. (currently amended) The transition of claim 24 1, wherein said support plate is metal.

26. (cancelled)

27. (currently amended) The transition of claim 124, wherein said support plate is at least 1mm thick.

28. (original) An ACC system comprising the transition of claim 1.

29. (currently amended) A method for transmitting a mm-wave signal from a first plane to a second plane using a transition, method comprising:
providing a transition for transmitting a mm-wave signal from one plane to another, said transition comprising:
first and second transmission lines on parallel planes;
a waveguide orthogonal to said first and second transmission lines, wherein said first and second transmission lines are suitable for transmitting a TEM mode signal and said waveguide is suitable for transmitting a waveguide mode signal; a support plate between said first and second transmission lines, said support plate defining a borehole with conductive walls between said first and second transmission lines;
a metalized dielectric filler comprising at least one conductive layer and being disposed in said borehole such that said conductive layer and at least a portion of said conductive walls of said borehole form said waveguide, whereby said waveguide is smaller than said borehole;
transmitting a mm-wave signal along ~~said a first transmission line in a first plane;~~
converting said signal from ~~one mode of either a TEM mode or a waveguide mode to the other mode of either said TEM mode or said a waveguide mode~~ using a transducer;
transmitting said signal along ~~said waveguide a third transmission line orthogonal to said first transmission line in said waveguide~~ other mode to a second plane parallel to said first plane;
converting said signal back to said TEM ~~one~~ mode; and
transmitting said signal in said TEM ~~one~~ mode along said second transmission line in said second plane.

30. (original) The method of claim 29, wherein said signal is between about 65 to about 85 GHz.
31. (original) The method of claim 29, wherein said reflective loss is better than 15 dB and the insertion loss is better than 0.6 dB.
32. (currently amended) The method of claim 29, wherein the length of said waveguide~~third transmission line~~ is greater than 10% of the wavelength of said signal.
33. (withdrawn) A method of manufacturing said transition, said method comprising:
providing a support plate;
boring a hole in said support plate;
inserting a waveguide filler in said hole;
providing first and second mm-wave boards, each board comprising an integrated transmission line and a transducer having a waveguide portion; and
affixing said first and second mm-wave boards to each side of said support plate such that said transition lines are orthogonal to said waveguide and that said waveguide is axially aligned with said waveguide portion of each transducer.
34. (new) The transition of claim 1, further comprising first and second transducers, said first transducer coupled between said first transmission line and said waveguide, said second transducer coupled between said second transmission line and said waveguide, each of said transducers having a conversion portion comprising one or more fins perpendicular to its respective transmission line and being suitable for converting a signal between a TEM mode and a rectangular waveguide modes and having a waveguide portion adjacent said

aveguide to facilitate coupling of a signal in said rectangular waveguide mode between said waveguide and the transducer.